

The Path to Net Zero Emissions

Dr Peter Mayfield

Commonwealth Scientific and Industrial Research Organisation (CSIRO) Australia

1. Introduction

CSIRO is Australia's national science agency, solving the greatest challenges through innovative science and technology. In CSIRO we deliver science, technology and solutions to be benefit of Australia.

CSIRO is well positioned to take a strong role as Australia's energy transition towards net zero emissions.

So, what do we mean by energy transition?

The energy sector in Australia is navigating a major transition at a time when extreme weather events and climate change impacts show that the pace of greenhouse gas emissions reduction must accelerate.

We need to reduce our dependency on coal and transition to lower emission sources, that is, to decarbonize the energy sector.

It means more solar PV, improved energy efficiency and more intelligent systems in our homes. When widening the scope, it means electrification of vehicles and decarbonizing the industry. And, further afield, we need to transition evolving our export market from coal, to LNG, and to clean hydrogen.

2. R&D activities related to clean energy technology

CSIRO is broadly engaged with the applied science and research – and integrated renewable energy systems - focused on zero emission energy future (*further information on programs/projects are found in the template*)

- Electricity network transformation: Building simulation and analysis tools and facilities, to inform investments in electricity grid systems.
- Industry and transport transition: Delivering technologies and solutions to enable shift from fossil energy to electricity, increased use of renewables and low emission fuels such as hydrogen ammonia.
- Renewable energy: Supporting the increase in renewable energy generation and energy storage solutions to secure a reliable electricity network, and reduce emissions in industrial and transport sectors
- Natural gas: Improving natural gas productivity, reducing emissions and securing natural gas supply as a low emission alternative to coal as coal-fired generation is reduced,
- Carbon capture, utilisation and storage (CCUS): Reducing emissions and creating value from carbon waste streams.
- Concentrating solar thermal: Using uniquely-designed heliostats and high-temperature central receivers to lower emissions from industrial processes

3. Specific research activities in hydrogen, CCUS, and related technologies

Australia's National Hydrogen Strategy outlines the need to foster industry hubs to develop economies of scale.

Our Hydrogen Industry Mission supports this critical goal, by bringing together the multidisciplinary strengths of CSIRO researchers and leveraging our domestic and global networks to create collaborative, industry-focused demonstration projects.

As well as providing a clear path to market for emerging technologies, this work will derisk hydrogen export pathways and accelerate the creation of this exciting new industry.

Collaboration between major industry players in these hubs will see large-scale and interconnected hydrogen value chains unfold, ultimately leading to 'sector coupling' between energy, industry and transport applications.

CSIRO is the natural bridge connecting industry with the research community to deliver expert advice, technology innovation, engineering, prototyping and enabling science to support development of a whole new industry.

National science agencies in Canada, Japan, China, Europe, and the US have long recognised the benefits of such a collaborative approach and CSIRO also has delivered strongly through co-designing and collaboration.

(further information on programs/projects are found in the template)

4. International collaboration

4-1 International alliance/networking development

CSIRO's Global Strategy aims to connect Australia to the global science, technology and innovation frontier as well as access new markets for Australian innovation. CSIRO has extensive number of international activities and collaborations around the world.

For us, collaborations are fundamental way of how we work and find solutions to the greatest challenges we face on the planet. We have collaborations with research intuitions in the G20 members which include innovations in clean energy technologies.

4-2 International joint R&D activities

Last year at this conference Larry Marshall introduced the Australian Solar Thermal Research Institute (ASTRI)

ASTRI has now grown to a \$110 million, eleven-year global research initiative creating international collaboration with research institutions, industry bodies and universities

ASTRI has led to solar thermal partnerships with the US DOE Gen3 program participants NREL and Sandia National Laboratories, as well as Japan's Mitsubishi Hitachi Power Systems, the Cyprus Institute, Thermal Focus in China and Heliostat SA in Australia.

5. Future perspectives

CSIRO is focused on supporting the energy transition and drive towards net zero emissions, increasing our capability in renewables and digital energy technologies, investing in more clean energy growth areas and taking on big projects with strategic partners both in Australia and around the world.

Biography

Dr Peter Mayfield commenced as CSIRO's Executive Director for Environment, Energy and Resources in December 2016, having worked in research and development for more than 25 years in both industry and government sectors, with extensive experience in research management over the breadth of the environment, energy and resources domains. In this role he has responsibility for approximately 1400 researchers who aim to provide science and technology solutions to enhance the value Australia derives from its vast energy and minerals resources while maintaining and enhancing our unique environment.